Medical Memoranda

Use of Plasmapheresis in Blood Donors

Our studies on this subject began in May, 1950, because the demand for plasma in our blood bank far exceeded that for packed cells. It seemed a pity to throw away the red cells, which are precisely the portion of blood that requires more time and material for its regeneration. It is known that 100 ml. of blood contains some 16 g. of haemoglobin, a specialized protein whose metabolism is linked with the metabolism of iron, while the same amount of blood contains only 4 g. of plasma proteins, whose regeneration is considered to be both qualitatively and quantitatively much easier. It is also well known that in most cases haemoglobin regeneration is the deciding factor in establishing the safe interval between bleedings of blood donors. To regenerate 100 ml. of whole blood the building material for 16 g. of haemoglobin and 4 g. of plasma protein plus the corresponding amount of iron should be supplied. To regenerate the amount of plasma yielded by 100 ml. of whole blood only the building material for 4 g. of plasma protein should be supplied. There are, of course, many other considerations that make it clear that the production of plasma protein in man should be expected to be much more rapid than haemoglobin production.

METHOD

From May, 1950, to July, 1951, we performed plasmapheresis in over 320 cases. Our experience has led us to adopt the following technique.

At weekly intervals the donor is bled for plasma, using the same apparatus as for blood collection, approximately 400 ml. of blood being drawn into acid-citrate–dextrose mixture. Immediately after the bleeding the red-cell suspension taken the previous week from the same donor is injected by gravity through the same needle, using a drip counter. The whole collection–injection process is thus made with a single venepuncture, and as a rule takes some 8–10 minutes. Shortly after collection the blood is centrifuged, and is kept in this condition in the refrigerator until the following week, when the plasma is removed and the packed cells are suspended in citrate–saline, ready for injection.

As implied, donors are bled for plasma every week—actually the same day each week. We presumed that such a time interval should be more than sufficient for plasma regeneration, and we felt that the reinjected cells could hardly have been damaged by storage. Our expectations have been fulfilled. In two instances we have performed weekly plasmapheresis for about one year with scarcely any interruption. Plasma examinations do not show significant change, and subjectively these plasma donors declare that they feel quite normal throughout.

SELECTION AND EXAMINATION OF DONORS

As a routine, however, we prefer to change our donors as a safety measure after a few months of plasmapheresis. We think this precaution is worth adopting, as we are dealing with a new technique in which there is no experience beyond our own.

We have chosen as our plasma donors those who appear to be in the best physical condition and whose standard of living leads us to expect that plasma regeneration will not be hampered by poor constitution or undernourishment.

Laboratory Examinations.—Every week we perform haemoglobin and total plasma protein estimations. Every month we carry out Wassermann and Meinicke tests and determine the albumin:globulin ratio. So far no donor has had to be rejected for failure to regenerate the plasma protein completely.

Besides the advantage that with plasmapheresis there is no waste of red cells, there are other advantages—for example, easy control of the donor's health and the practically complete exclusion of danger of transmission of jaundice. The method also reduces the number of donors as well as the clerical work, since the donors come automatically at regular intervals, usually once a week.

We have also carried out plasmapheresis in a few pathological conditions. In essential and renal hypertension we have found a striking subjective improvement, which, however, is not matched by a corresponding betterment of the objective symptoms. Thus headache and mental sluggishness disappear, while blood pressure and renal-function tests show little improvement. The use of plasmapheresis in treatment of disease will be the subject of further study.

SUMMARY AND CONCLUSIONS

The first use of plasmapheresis in blood donors is described, with details of the technique employed and of the criteria adopted for the selection and regular examination of plasma donors.

About 200 ml. of plasma may be drawn safely from a healthy person every week for short periods, and perhaps even for longer ones.

Subjective improvements are reported from a few pathological cases.

J. A. GRIFOLS-LUCAS, M.D.,
Blood and Plasma Bank,
Laboratorios Grifols, Barcelona, Spain.

Spontaneous Arterial Occlusion During an Epileptic Fit

The development of a spontaneous obstruction in a peripheral artery during an epileptic fit is a rare occurrence. It is therefore of interest to record a case in which the lumen of the left posterior tibial artery became occluded during a major epileptic attack, with subsequent ischaemic cramp in the leg.

CASE REPORT

The patient, a man aged 47, had suffered from attacks of idiopathic major epilepsy for many years. These had been controlled by soluble phenytoin and phenobarbitone tablets, but on April 9, 1950, he had three fits following one after another. When he regained consciousness he found that his left leg was white and lifeless below the level of the mid-calf. There was no sign of any external injury. It was 16 hours before sensation returned to the leg, and the foot remained numb for four days. He then complained that the left foot felt cold and that cramp occurred in the calf and foot when he had walked about 200 yards (183 metres). The pain wore off after resting for a few minutes.

He was first seen at the West End Hospital for Nervous Diseases a month after the onset of the symptoms. The whole of the left foot was then colder and paler than the right. There was no pulsation in the dorsalis pedis artery or in the posterior tibial artery at the ankle. Above the knee and throughout the right leg normal pulsations were felt. The cardiovascular system was otherwise healthy; there was no evidence of peripheral arteriosclerosis, and his blood pressure was 130/85. The blood Wassermann reaction was negative, and no vascular calcification was seen in the radiographs of the legs.

He was treated with Buerger's exercises and was given tolazoline hydrochloride ("priscol"), 25 mg., and nicotinic acid, 100 mg., each three times a day by mouth. The symptoms in the left leg subsequently improved. By September he could walk 300 yards (274 metres) before experiencing cramp in the calf, and could manage to play nine holes of golf. In January, 1951, the foot was warm as far as halfway down the instep, but it was cold beyond this, without, however, any discoloration of the skin. In April he could walk without experiencing any cramp at all and play a full round of golf. The left foot was equal in warmth to the right to within an inch (2.5 cm.) of the base of the toes. There was still no pulsation in either the dorsalis pedis or the posterior tibial artery.